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Dr. Middleton PHYS 132 HW
Ch. 22

CQ: 3
P: 2, 4, 8
4-18-17

Problems

22.P.2 $y_m = \frac{m\lambda L}{d}$

m_3 and m_4 overlap which means they are equal

$y_3 = \frac{m_3 \lambda_3 L}{d}$ $y_4 = \frac{m_4 \lambda_4 L}{d}$ $m_3 = 3$ $\lambda_3 = 600 \times 10^{-9} m$ $m_4 = 4$

$\frac{m_3 \lambda_3 L}{d} = \frac{m_4 \lambda_4 L}{d}$

$m_3 \lambda_3 = m_4 \lambda_4$

$\lambda_4 = \frac{m_3 \lambda_3}{m_4}$

$\lambda_4 = 4.5 \times 10^{-7} m$

$\lambda = 4.5 \times 10^{-7} m$

22.P.4

$\lambda = 600\ nm$
$d = 1.8\ mm$

$y = \frac{\lambda L}{d}$

$\lambda = 400\ nm$

$\frac{\lambda_1 L}{d_1} = \frac{\lambda_2 L}{d_2}$

$\frac{\lambda_1}{d_1} = \frac{\lambda_2}{d_2}$

$\lambda_2 = 400 \times 10^{-9}\ m$
$d_1 = 1.8 \times 10^{-3}\ m$
$\lambda_1 = 600 \times 10^{-9}\ m$

$\frac{d_1}{\lambda_1} = \frac{d_2}{\lambda_2}$ $\quad d_2 = \frac{\lambda_2 d_1}{\lambda_1}$ $\quad d_2 = 1.2\ mm$

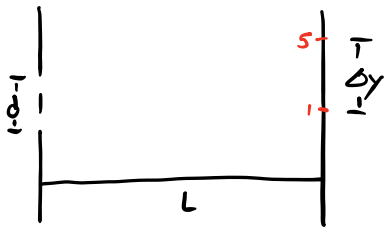
$d_2 = 1.2\ mm$

22.P.8 $y_m = \frac{m\lambda L}{d}$

$d = 0.20\,mm$

$L = 60\,cm$

$\Delta y = 6.0\,mm$



$\Delta y = 5 - 1$

$\lambda = 500\,nm$

$$\Delta y = \frac{5\lambda L}{d} - \frac{\lambda L}{d}$$

$$\Delta y = \frac{\lambda L}{d}(5 - 1)$$

$$\frac{\Delta y}{4} = \frac{\lambda L}{d} \qquad \lambda = \frac{d\Delta y}{4L} \qquad \lambda = 5.0 \times 10^{-7}\,m$$

Conceptual

22.CQ.3] $\Delta y = \frac{\lambda L}{d}$

a.) The fringe spacing will decrease

b.) The fringe spacing will increase

c.) The fringe spacing will decrease

d.) It is equal at this dot from center to left and right.